

Serial No.: 10/798,131
Response to 7/5/06 Office Action
Gibbons Docket No.: 105942-53917

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Amendments to the Claims

This listing of claims replaces all prior listings of claims in this application.

Claims 1-58 (canceled)

Claim 59 (currently amended) A process for preparing a partially protected procyanidin dimer which comprises the steps of:

- (a) protecting each phenolic hydroxyl group of an epicatechin or a catechin monomer;
- (b) activating the monomer from step (a) by introducing an acyloxy group at the C-4 position; and
- (c) catalytically coupling the monomer from step (b) with an unprotected epicatechin or an unprotected catechin monomer, ~~optionally having a halo-blocking group at the C-8 position,~~ to form a partially protected procyanidin dimer where the top mer is protected~~[[,]]~~ and where the bottom mer is unprotected, ~~and where the bottom mer the halo-blocking group.~~ [check original].

Claims 60-61 (canceled)

Claim 62 (previously presented) The process of Claim 59, wherein the protecting groups are benzyl groups and wherein the protecting step is carried out with benzyl bromide in dimethyl formamide or dimethyl acetamide.

Claim 63 (previously presented) The process of Claim 59, wherein the protecting groups are p-methoxybenzyl groups and the protecting step is carried out with p-methoxybenzyl chloride in dimethyl formamide.

Claim 64 (previously presented) The process of Claim 62, wherein the protecting step is carried out in the presence of potassium carbonate or potassium iodide.

Claim 65 (previously presented) The process of Claim 59, wherein the activating step is carried out using as an oxidizing agent a lead salt selected from the group consisting of lead acetate, lead formate, and lead propionate in a solvent selected from the group consisting of benzene, toluene, chlorobenzene, cyclohexane, heptane, carbon tetrachloride, and mixtures thereof.

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Claim 66 (previously presented) The process of Claim 65, wherein the lead acetate is used in combination with acetic acid; wherein the lead formate is used in combination with formic acid; wherein the lead propionate is used in combination with propionic acid; and wherein the solvent in the activating step is benzene-acetic acid.

Claim 67 (previously presented) The process of Claim 59, wherein the catalyst used in the coupling step is a Lewis acid selected from the group consisting of lithium bromide and lithium iodide.

Claim 68 (currently amended) A process for preparing a linear procyanidin oligomer having 4→8 linkages, which process comprises the steps of:

- (a) preparing a partially protected 4→8 procyanidin dimer where the phenolic hydroxyl groups of the top mer are protected with removable protecting groups which do not deactivate the A-ring of the protected mer and where the phenolic hydroxyl groups of the bottom mer are unprotected;
- (b) masking the dimer of step (a) with removable masking groups which deactivate the bottom mer to form a dimer where the phenolic hydroxyl groups of the top mer are protected, where the phenolic hydroxyl groups of the bottom mer are masked, and where the hydroxyl groups at the C-3 positions of both mers are masked;
- (c) deprotecting the dimer of step (b) to form a dimer where the phenolic hydroxyl groups of the top mer are unprotected, where the phenolic hydroxyl groups of the bottom mer are masked, and where the hydroxyl groups at the C-3 positions of both mers are masked;
- (d) catalytically coupling the dimer of step (c) with a protected catechin monomer or a protected epicatechin monomer having an acyloxy activating group at the C-4 position to form a 4→8 trimer where the phenolic hydroxyl groups of the top mer are protected, where the phenolic hydroxyl groups of the middle mer are unprotected, where the phenolic hydroxyl groups of the bottom mer are masked, and where the hydroxyl groups at C-3 positions of the middle and the bottom mers are masked.

Claim 69 (previously presented) The process of Claim 68, further comprising the step(s) of demasking and/or deprotecting the trimer of step (d).

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Claim 70 (previously presented) The process of Claim 68, which process further comprises the steps of:

(e) masking the trimer of step (d) to form a trimer where the phenolic hydroxyl groups of the top mer are protected, where the phenolic hydroxyl groups of the middle and bottom mers are masked, and where the hydroxyl groups at the C-3 positions of all the mers are masked;

(f) deprotecting the trimer of step (e) to form a trimer where the phenolic hydroxyl groups of the top mer are unprotected, where the phenolic hydroxyl groups of the middle and bottom mers are masked, and where the hydroxyl groups at the C-3 positions of all the mers are masked; and

(g) catalytically coupling the trimer of step (f) with a protected catechin monomer or a protected epicatechin monomer having an acyloxy activating group at the C-4 position to form a 4→8 tetramer where the phenolic hydroxyl groups of the top mer are protected, where the phenolic hydroxyl groups of the middle mers and the bottom mer are masked, and where the hydroxyl groups at the C-3 positions of the middle mers and the bottom mer are masked; and

(h) optionally repeating the masking, deprotecting, and coupling steps to form a higher oligomer.

Claim 71 (previously presented) The process of Claim 70, further comprising the step(s) of demasking and/or deprotecting the tetramer of step (g) or higher oligomer of step (h).

Claim 72 (previously presented) The process of Claim 70, wherein the higher oligomers include pentamers through dodecamers.

Claim 73 (previously presented) The process of Claim 70, wherein the higher oligomers are the pentamers.

Claim 84 (withdrawn) A process for preparing a (4→8) or a (4→6) procyanidin dimer, which process comprises the steps of:

(a) protecting each phenolic hydroxyl group of an epicatechin or a catechin monomer with a removable protecting group which does not deactivate the A ring of the monomer;

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(b) activating the protected monomer of step (a) by introducing at the C-4 position an acyloxy group selected from the group consisting of acetoxy, formyloxy, and propionyloxy using a lead (IV) salt which is selected from the group consisting of lead tetraacetate, lead tetraformate, and lead tetrapropionate;

(c) catalytically coupling the protected, C-4 activated monomer of step (b) with an unprotected catechin or epicatechin monomer, optionally having an 8-halo blocking group, to form a partially protected procyanidin dimer wherein the top mer is protected and the bottom mer is optionally blocked; and

(d) deprotecting the protected dimer of step (c) to form the (4→8) procyanidin dimer or deprotecting and deblocking the blocked, protected dimer of step (c) to form the (4→6) procyanidin dimer.

Claim 85 (withdrawn) The process of Claim 84, wherein a solvent is used in the activating step.

Claim 86 (withdrawn) The process of Claim 85, wherein the solvent is selected from the group consisting of benzene, toluene, chlorobenzene, cyclohexane, heptane, carbon tetrachloride, and mixtures thereof with an organic acid.

Claim 87 (withdrawn) The process of Claim 86, wherein the activating step is carried out using a mixture of the solvent with the organic acid.

Claim 88 (withdrawn) The process of Claim 87, wherein the organic acid is the same as the acid used for making the lead (IV) salt.

Claim 89 (withdrawn) The process of Claim 88, wherein the organic acid is formic acid, acetic acid, or propionic acid.

Claim 90 (withdrawn) The procyanidin dimer of Claim 84, which is selected from the grouping consisting of epicatechin-(4→8)-catechin, catechin-(4→8)-catechin, and catechin-(4→8)-epicatechin.

Claim 91 (withdrawn) The dimer of Claim 90, which is (-)-epicatechin-(4β,8)-(-)-epicatechin and (-)-epicatechin-(4β,8)-(+)-catechin.

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Claim 92 (withdrawn) The procyanidin timer of Claim 84, which is selected from the group consisting of catechin-((4→6)-catechin, catechin-(4→6)-epicatechin, epicatechin-(4→6)-epicatechin, and epicatechin-(4→6)-catechin.